# Composing a string quartet in around some steps.

Luigi Negretti Lanner

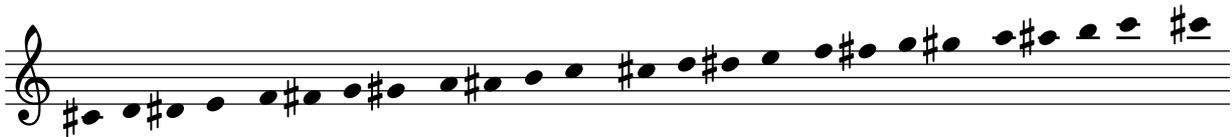
January 1, 2012

**Abstract**

*This article describes the composition of a music piece for string quartet, by starting from sets of musical symbols of pithces, duration unities, tuplets, timbre and intesity. The piece is obtained by using some methods to arrange the symbols into musical sequences. These methods are based on pseudorandom generation and prearranged combinations. The main goal of the article is to provide the reader with a practical example about how to compose a piece using these methods.*

## 1 Sets of musical symbols

### 1.0.1

Set $A$, formed by the pitches:[1]

and then divided in the four subsets:

$A = \{\ A_1,\ \ A_2,\ \ A_3,\ \ A_4\ \}$

### 1.0.2

Set $D$, formed by symbols of duration unities.

*s* (sixteenth) *e* (eighth) *q* (quarter)

$D = \{\ s,\ \ e,\ \ q\ \}$

[1] For brevity, are not included here the octave transpositions of the parts of cello and viola, relating to the set $A$

#### 1.0.3

Set $G$, formed by symbols of tuplets: 4/6, 4/7, 8/9

$$G = \left\{ \ g_{x6}, \quad g_{x7}, \quad g_{x9} \ \right\}$$

#### 1.0.4

Set $I$ formed by symbols of dynamics

$$I = \left\{ \ mf, \quad f, \quad ff, \quad fff, \quad ,ffff, \quad sfz, \quad pppp, \quad ppp, \quad pp, \quad p, \quad mp, \quad <, \quad > \ \right\}$$

#### 1.0.5

Set *TA*, formed by symbols of timbre: sul tasto, al ponte, ordinario
$TA = \left\{ \ st, \quad ap, \quad or \ \right\}$

#### 1.0.6

Set *TB*, formed by symbols of timbre: tremolo, pizzicato, balzato
$TB = \left\{ \ tr, \quad pi, \quad ba \ \right\}$

#### 1.0.7

Set *TC*, formed by symbols of timbre: armonico
$TC = \left\{ \ ar \ \right\}$

#### 1.0.8

Set *TD*, formed by symbols of timbre: accento,
$TD = \left\{ \ ac \ \right\}$

# 2 Methods

The piece is composed of sequences of n-uple each one formed by all or some elements of the sets indicated above.
These sequences forms the sections $W$, $X$, $Y$, $Z$, that differ between them, being each one formed by differents subsets of $A$, $D$, $G$, $I$, $TA$, $TB$, $TC$, $TD$.

## 2.1 Sections

$W = A_1 x\{s, e\} x G x\{pppp, ppp, pp, p, sfz, >\} x\{st, ap\} x\{pi, ba\}$
$X = A_2 x\{s, e\} x G x\{pppp, ppp, pp, p, sfz, >\} x\{st, ap\} x\{pi, ba\}$
$Y = A_3 x\{s\} x G x\{sfz, p\} x\{ap\} x\{ba\}$
$Z = A_4 x\{q\} x G x\{ffff, pp\} x\{tr\} x\{ap, st\} x\{ar\} x\{ac\}$

## 2.2 Combining the sections

Acting on sections, on their combination and on their length, we can changing substantially the musical meaning of the piece. For example, the combination:

**2.2.1**

| | |
|---:|---|
| I Violino | $W^n\ X^n\ Y^n\ Z^n$ |
| II Violino | $Z^n\ W^n\ Y^n\ X^n$ |
| Viola | $X^n\ Z^n\ Y^n\ W^n$ |
| Violoncello | $W^n\ X^n\ Y^n\ Z^n$ |

will surely gives a very different result, musically, from what we could get from:

**2.2.2**

| | |
|---:|---|
| I Violino | $W^n\ X^n\ Y^n\ Z^n$ |
| II Violino | $W^n\ X^n\ Y^n\ Z^n$ |
| Viola | $W^n\ X^n\ Y^n\ Z^n$ |
| Violoncello | $W^n\ X^n\ Y^n\ Z^n$ |

or from:

**2.2.3**

| | |
|---:|---|
| I Violino | $W^n\ W^n\ W^n\ W^n$ |
| II Violino | $X^n\ X^n\ X^n\ X^n$ |
| Viola | $Z^n\ Z^n\ Z^n\ Z^n$ |
| Violoncello | $Y^n\ Y^n\ Y^n\ Y^n$ |

...and so on.

The lenght of the sections is another element on which we can act. It is represented by the number of n-uple, from which the sections are formed. For example, from the following combination:

**2.2.4**

| | |
|---:|---|
| I Violino | $W^{300}\ X^{10}\ Y^{10}\ Z^{10}$ |
| II Violino | $Z^{10}\ W^{300}\ Y^{10}\ X^{10}$ |
| Viola | $X^{10}\ Z^{10}\ Y^{10}\ W^{300}$ |
| Violoncello | $W^{300}\ X^{10}\ Y^{10}\ Z^{10}$ |

we will get a piece in which the musical elements that form $W$ will be the most presents.

## 2.3 General criteria to obtain the sequences

To get the sequences of musical notes, we can proceed in two ways:

- Ordering the elements of $A$, $D$, $G$, $I$, $TA$, $TB$, $TC$ $TD$ by using not stochastic criteria.
- Ordering the elements of $A$, $D$, $G$, $I$, $TA$, $TB$, $TC$ $TD$ by using stochastic criteria.

In this practical example, we will use the pseudorandom generation for the sets $A$, $D$, $G$.

# 3 Generating sequences of $A$, $D$, $G$

The software used to generate the musical sequences is Lyg:

- http://sourceforge.net/projects/lyg/files/

Lyg generates musical sequences in Lilypond syntax. A typical Lyg output is as follow:

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%Lygen Session Data: Sun May  1 11:50:43 2011
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
\times 4/6 { f’’ 8 ^"pizz."[cis’’ 8 b’ 8 b’ 8 c’’’ 8 b’ 8 ]}
\times 4/6 { d’’ 8[c’’ 8 c’’ 8 gis’’ 8 ais’’ 8 e’’ 8 ]}
\times 4/6 { gis’’ 8[fis’’ 8 c’’’ 8 dis’’ 8 dis’’ 8 dis’’ 8 ]}
\times 4/6 { c’’’ 16 -.^"arco" \sfz \> \startTextSpan [ais’’ 16 -. c’’ 16 -. fis’’ 16 -. cis’’ 16 -. \stopTextSpan   c’’ 16 -. \! \pp ]}
\times 4/7 { a’’ 8 ^"pizz."[c’’’ 8 gis’’ 8 ais’’ 8 c’’ 8 f’’ 8 c’’ 8 ]}
\times 8/9 { b’’ 16 -.^"arco" \sfz \> \startTextSpan [b’ 16 -. fis’’ 16 -. c’’’ 16 -. e’’ 16 -. ais’’ 16 -. b’’ 16 -. d’’ 16 -. fis’’ 16 -. ]}
\times 8/9 { b’’ 16 -.[b’ 16 -. b’ 16 -. c’’ 16 -. gis’’ 16 -. cis’’ 16 -. dis’’ 16 -. ais’’ 16 -. d’’ 16 -. ]}
\times 4/7 { gis’’ 16 -.[b’ 16 -. e’’ 16 -. a’’ 16 -. b’’ 16 -. gis’’ 16 -. gis’’ 16 -. ]}
\times 8/9 { f’’ 16 -.[g’’ 16 -. a’’ 16 -. b’’ 16 -. f’’ 16 -. f’’ 16 -. c’’’ 16 -. gis’’ 16 -. dis’’ 16 -. ]}
\times 8/9 { d’’ 16 -.[cis’’ 16 -. e’’ 16 -. gis’’ 16 -. c’’ 16 -. c’’ 16 -. b’ 16 -. b’’ 16 -. d’’ 16 -. ]}
\times 4/6 { dis’’ 16 -.[a’’ 16 -. dis’’ 16 -. g’’ 16 -. ais’’ 16 -. \stopTextSpan   f’’ 16 -. \! \pp ]}
\times 4/7 { cis’’ 8^"pizz."[cis’’ 8 gis’’ 8 e’’ 8 c’’ 8 fis’’ 8 gis’’ 8 ]}
\times 8/9 { g’’ 16 -.^"arco" \sfz \> \startTextSpan [d’’ 16 -. f’’ 16 -. e’’ 16 -. g’’ 16 -. gis’’ 16 -. d’’ 16 -. cis’’ 16 -. e’’ 16 -. ]}
\times 4/6 { fis’’ 16 -.[b’’ 16 -. b’ 16 -. c’’ 16 -. b’’ 16 -. \stopTextSpan   d’’ 16 -. \! \p ]}
\times 4/7 { b’’ 8^"pizz."[e’’ 8 cis’’ 8 dis’’ 8 cis’’ 8 b’’ 8 f’’ 8 ]}
\times 4/6 { c’’ 8[b’ 8 gis’’ 8 cis’’ 8 fis’’ 8 f’’ 8 ]}
\times 8/9 { cis’’ 8[e’’ 8 dis’’ 8 b’’ 8 g’’ 8 gis’’ 8 dis’’ 8 c’’ 8 ais’’ 8 ]}
\times 4/7 { b’’ 8[dis’’ 8 a’’ 8 f’’ 8 e’’ 8 g’’ 8 fis’’ 8 ]}
\times 4/7 { gis’’ 16 -.^"arco" \sfz \> \startTextSpan [f’’ 16 -. b’ 16 -. cis’’ 16 -. e’’ 16 -. b’ 16 -. \stopTextSpan  b’’ 16 -. \! \p ]}
\times 4/6 { ais’’ 8^"pizz."[cis’’ 8 c’’’ 8 g’’ 8 d’’ 8 c’’ 8 ]}
\times 4/6 { a’’ 16^"arco" -. \sfz \> \startTextSpan [fis’’ 16 -. ais’’ 16 -. d’’ 16 -. a’’ 16 -. cis’’ 16 -. ]}
\times 4/7 { fis’’ 16 -.[dis’’ 16 -. c’’ 16 -. gis’’ 16 -. a’’ 16 -. b’ 16 -. gis’’ 16 -. ]}
\times 4/7 { ais’’ 16 -.[e’’ 16 -. ais’’ 16 -. dis’’ 16 -. c’’’ 16 -. dis’’ 16 -. \stopTextSpan  dis’’ 16 -. \! \p ]}
\times 4/7 { d’’ 8^"pizz."[g’’ 8 dis’’ 8 cis’’ 8 dis’’ 8 f’’ 8 e’’ 8 ]}
\times 8/9 { c’’ 16 -.^"arco" \sfz \> \startTextSpan [e’’ 16 -. c’’ 16 -. a’’ 16 -. c’’ 16 -. e’’ 16 -. g’’ 16 -. c’’ 16 -. b’ 16 -. ]}
\times 8/9 { f’’ 16 -.[dis’’ 16 -. ais’’ 16 -. d’’ 16 -. d’’ 16 -. b’’ 16 -. dis’’ 16 -. e’’ 16 -. \stopTextSpan  d’’ 16 -. \! \p]}
\times 8/9 { b’’ 8^"pizz."[c’’’ 8 dis’’ 8 ais’’ 8 e’’ 8 b’’ 8 gis’’ 8 b’ 8 fis’’ 8 ]}
\times 4/7 { d’’ 8[b’ 8 c’’ 8 c’’ 8 fis’’ 8 a’’ 8 g’’ 8 ]}
\times 4/6 { e’’ 8[e’’ 8 e’’ 8 c’’’ 8 b’ 8 e’’ 8 ]}
\times 8/9 { ais’’ 8[dis’’ 8 b’ 8 dis’’ 8 ais’’ 8 d’’ 8 b’’ 8 c’’ 8 cis’’ 8 ]}
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%Lygen Session Data: Sun May  1 11:52:07 2011
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
\times 8/9 { gis’’ 16 -.^\markup { \column { \line {arco, al ponte}  } }
\sfz  [gis’’ 16 -. c’’’ 16 -. fis’’ 16 -. fis’’ 16 -. ais’’ 16 -. e’’ 16 -. e’’ 16 -. cis’’’ 16 -. \sfz  ]}
\times 4/6 { cis’’’ 16 -.[cis’’’ 16 -. a’’ 16 -. gis’’ 16 -. g’’ 16 -. gis’’ 16 -. ]}
\times 8/9 { fis’’ 16 -.[a’’ 16 -. b’’ 16 -. gis’’ 16 -. fis’’ 16 -. gis’’ 16 -. e’’ 16 -.  gis’’ 16 -.  fis’’ 16 -. \sfz ]}
\times 4/7 { fis’’ 16 -.[c’’’ 16 -. g’’ 16 -. cis’’’ 16 -. g’’ 16 -. f’’ 16 -. a’’ 16 -. ]}
\times 8/9 { cis’’’ 16 -.[b’’ 16 -.  ais’’ 16 -. ais’’ 16 -. fis’’ 16 -. g’’ 16 -. \sfz e’’ 16 -. cis’’’ 16 -. fis’’ 16 -. ]}
```

To generate the sequences of symbols of the sets $A$ $D$ and $G$ using Lyg, you can follow the instructions below. The instructions are represented through schemes easily referable to the controls of Lyg.

The tables on the left indicates the setting of values. The tables on the right indicates the buttons to press in sequence. The buttons to press are those under the numbers. To get the complete music score all the instructions below have to be executed in exact order, from the first to the last, one time only

- Instruction 1 -

### 3.0.1 Section $W$ - first violin

| Pitch | 40 | 12 |
|---|---|---|
| Dur | 1 | 2 |
| Int | / | / |
| Cho | 1 | 1 |
| Tup | 1 | 3 |

WFC = 30

| 1 | 2 | 3 | / | 4 | / | / | / |
|---|---|---|---|---|---|---|---|
| OS | OG | OI | RS | TS | CI | CG | CS |

- Instruction 2 -

### 3.0.2 Section $X$ - first violin

| Pitch | 50 | 14 |
|---|---|---|
| Dur | 1 | 2 |
| Int | / | / |
| Cho | 1 | 1 |
| Tup | 1 | 3 |

WFC = 30

| / | / | / | / | 5 | / | / | / |
|---|---|---|---|---|---|---|---|
| OS | OG | OI | RS | TS | CI | CG | CS |

- Instruction 3 -

### 3.0.3 Section $Y$ - first violin

| Pitch | 55 | 10 |
|---|---|---|
| Dur | 1 | 1 |
| Int | / | / |
| Cho | 1 | 1 |
| Tup | 1 | 3 |

WFC = 30

| / | / | / | / | 6 | / | / | / |
|---|---|---|---|---|---|---|---|
| OS | OG | OI | RS | TS | CI | CG | CS |

- Instruction 4 -

### 3.0.4 Section $Z$ - first violin

| Pitch | 40 | 16 |
|---|---|---|
| Dur | 3 | 1 |
| Int | / | / |
| Cho | 1 | 1 |
| Tup | 1 | 3 |

WFC = 30

| / | / | / | / | 7 | 8 | / | / |
|---|---|---|---|---|---|---|---|
| OS | OG | OI | RS | TS | CI | CG | CS |

- Instruction 5 -

### 3.0.5 Section $Z$ - second violin

| Pitch | 40 | 16 |
|---|---|---|
| Dur | 3 | 1 |
| Int | / | / |
| Cho | 1 | 1 |
| Tup | 1 | 3 |

WFC = 30

| / | / | 9 | / | 10 | / | / | / |
|---|---|---|---|---|---|---|---|
| OS | OG | OI | RS | TS | CI | CG | CS |

- Instruction 6 -

### 3.0.6 Section $W$ - second violin

| Pitch | 40 | 12 |
|---|---|---|
| Dur | 1 | 2 |
| Int | / | / |
| Cho | 1 | 1 |
| Tup | 1 | 3 |

WFC = 30

| / | / | / | / | 11 | / | / | / |
|---|---|---|---|---|---|---|---|
| OS | OG | OI | RS | TS | CI | CG | CS |

- Instruction 7 -

### 3.0.7 Section $Y$ - second violin

| Pitch | 55 | 10 |
|---|---|---|
| Dur | 1 | 1 |
| Int | / | / |
| Cho | 1 | 1 |
| Tup | 1 | 3 |

WFC = 30

| / | / | / | / | 12 | / | / | / |
|---|---|---|---|---|---|---|---|
| OS | OG | OI | RS | TS | CI | CG | CS |

- Instruction 8 -

### 3.0.8 Section $X$ - second violin

| Pitch | 50 | 14 |
|---|---|---|
| Dur | 1 | 2 |
| Int | / | / |
| Cho | 1 | 1 |
| Tup | 1 | 3 |

WFC = 30

| / | / | / | / | 13 | 14 | / | / |
|---|---|---|---|---|---|---|---|
| OS | OG | OI | RS | TS | CI | CG | CS |

- Instruction 9 -

### 3.0.9 Section $X$ - viola

| Pitch | 40 | 14 |
|---|---|---|
| Dur | 1 | 2 |
| Int | / | / |
| Cho | 1 | 1 |
| Tup | 1 | 3 |

WFC = 30

| / | / | 15 | / | 16 | / | / | / |
|---|---|---|---|---|---|---|---|
| OS | OG | OI | RS | TS | CI | CG | CS |

- Instruction 10 -

### 3.0.10 Section $Z$ - viola

| Pitch | 30 | 16 |
|---|---|---|
| Dur | 3 | 1 |
| Int | / | / |
| Cho | 1 | 1 |
| Tup | 1 | 3 |

WFC = 30

| / | / | / | / | 17 | / | / | / |
|---|---|---|---|---|---|---|---|
| OS | OG | OI | RS | TS | CI | CG | CS |

- Instruction 11 -

### 3.0.11 Section $Y$ - viola

| Pitch | 45 | 10 |
|---|---|---|
| Dur | 1 | 1 |
| Int | / | / |
| Cho | 1 | 1 |
| Tup | 1 | 3 |

WFC = 30

| / | / | / | / | 18 | / | / | / |
|---|---|---|---|---|---|---|---|
| OS | OG | OI | RS | TS | CI | CG | CS |

- Instruction 12 -

### 3.0.12 Section $W$ - viola

| Pitch | 30 | 12 |
|---|---|---|
| Dur | 1 | 2 |
| Int | / | / |
| Cho | 1 | 1 |
| Tup | 1 | 3 |

WFC = 30

| / | / | / | / | 19 | 20 | / | / |
|---|---|---|---|---|---|---|---|
| OS | OG | OI | RS | TS | CI | CG | CS |

- Instruction 13 -

### 3.0.13 Section $W$ - cello

| Pitch | 20 | 12 |
|---|---|---|
| Dur | 1 | 2 |
| Int | / | / |
| Cho | 1 | 1 |
| Tup | 1 | 3 |

WFC = 30

| / | / | 21 | / | 22 | / | / | / |
|---|---|---|---|---|---|---|---|
| OS | OG | OI | RS | TS | CI | CG | CS |

- Instruction 14 -

### 3.0.14 Section $X$ - cello

| Pitch | 30 | 14 |
|---|---|---|
| Dur | 1 | 2 |
| Int | / | / |
| Cho | 1 | 1 |
| Tup | 1 | 3 |

WFC = 30

| / | / | / | / | 23 | / | / | / |
|---|---|---|---|---|---|---|---|
| OS | OG | OI | RS | TS | CI | CG | CS |

- Instruction 15 -

### 3.0.15 Section $Y$ - cello

| Pitch | 35 | 10 |
|---|---|---|
| Dur | 1 | 1 |
| Int | / | / |
| Cho | 1 | 1 |
| Tup | 1 | 3 |

WFC = 30

| / | / | / | / | 24 | / | / | / |
|---|---|---|---|---|---|---|---|
| OS | OG | OI | RS | TS | CI | CG | CS |

- Instruction 16 -

### 3.0.16 Section $Z$ - cello

| Pitch | 20 | 16 |
|---|---|---|
| Dur | 3 | 1 |
| Int | / | / |
| Cho | 1 | 1 |
| Tup | 1 | 3 |

WFC = 30

| / | / | / | / | 25 | 26 | 27 | 28 |
|---|---|---|---|---|---|---|---|
| OS | OG | OI | RS | TS | CI | CG | CS |

### 3.0.17 Arranging sets $I$ and $T$

By executing the instructions above, you should will obtain a complete Lilypond music score with four parts, formed by the symbols of pitches and durations. The sets $I$ and $T$, related to the timbre and the dynamics, must be inserted now, directly into the Lilypond file, choosing the values from those available into the subset related to the specific section (see the point **3.1**), and disposing it, according to the chosen criteria.

# Compiling the Lilypond file

Once obtained the Lilypond file, to compile it simply open a shell into the directory where your file is in, and run the command: lilypond ./FILENAME.ly. A *.ps and a *.pdf files will be created by Lilypond. The first version of the piece, that was obtained through similar methods to those described in this document, can be found at:

- http://imslp.org/wiki/Foglio_No.20_(Negretti_Lanner,_Luigi)
- http://luiginegrettilanner.com/downloads

under the License Creative Commons Attribution Non-commercial No Derivatives 3.0,

# 4 Requirements

To realize the piece, by starting from this document, it is strongly suggested:

- A good command of the music composition technique including a good knowledge of:
  - Traditionals harmony and counterpoint.
  - Musical forms and compositive technique in the art music, before to the twentieth century.
  - Dodecaphony.
  - Integral serialism.
- A good knowledge of Lilypond.
- Having a Linux / Mac system, if you want to build the sequences as shown in the example above using Lyg.